SuperSystems UK

HB1000 Thermal Barrier User's Manual

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Overview

SSi's HB1000 Series In-Furnace Data Logging Device provides data gathering capabilities in a unit designed to withstand the stress of monitoring temperature from within a furnace. The thermal barrier is constructed with a stainless steel exterior and insulating components that protect the internal electronics for extended periods of time at temperature. The high accuracy electronics component supports 10 type K thermocouples with a maximum battery life of 40 hours. Using the USB connection, data can be easily imported in to SSi's SDS Reporter software for AMS 2750 D compliant reports.

Electronics Component

The switch on the bottom of the box turns the power on and off. Next to the switch is the USB port. When the electronics are not in use, the unit should be powered off and connected to a computer to charge. Keeping the unit powered off while not in use will drastically improve its battery life.

The functions of the LEDs are as follows, starting with the LED **furthest from the switch**:

1. Yellow LED. Blinking when power is on. Stops blinking but remains lit when connected to a computer via USB, thus charging.
2. Red LED. Blinking when connected to a computer via USB.
3. Red LED. Blinking when datalogging.
4. Green LED. Blinking when data is being transmitted via USB.
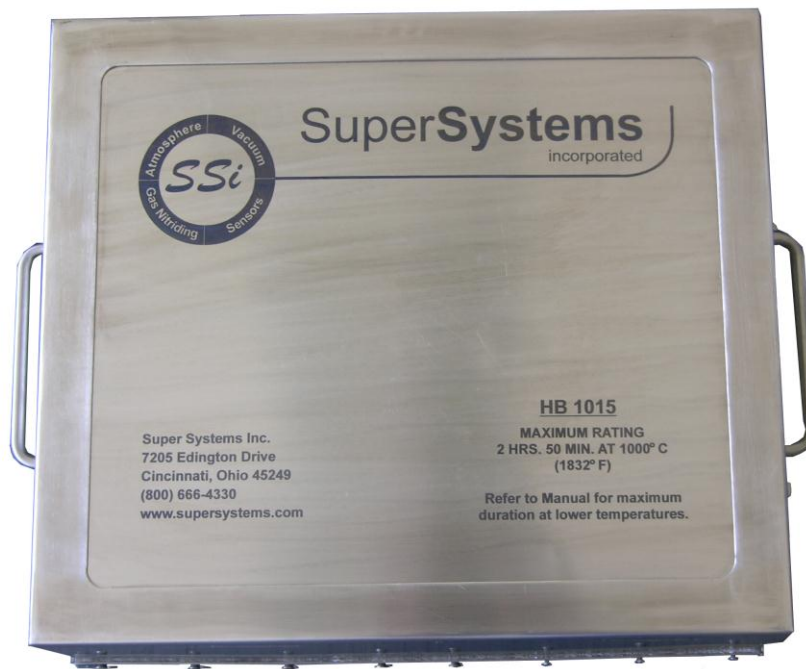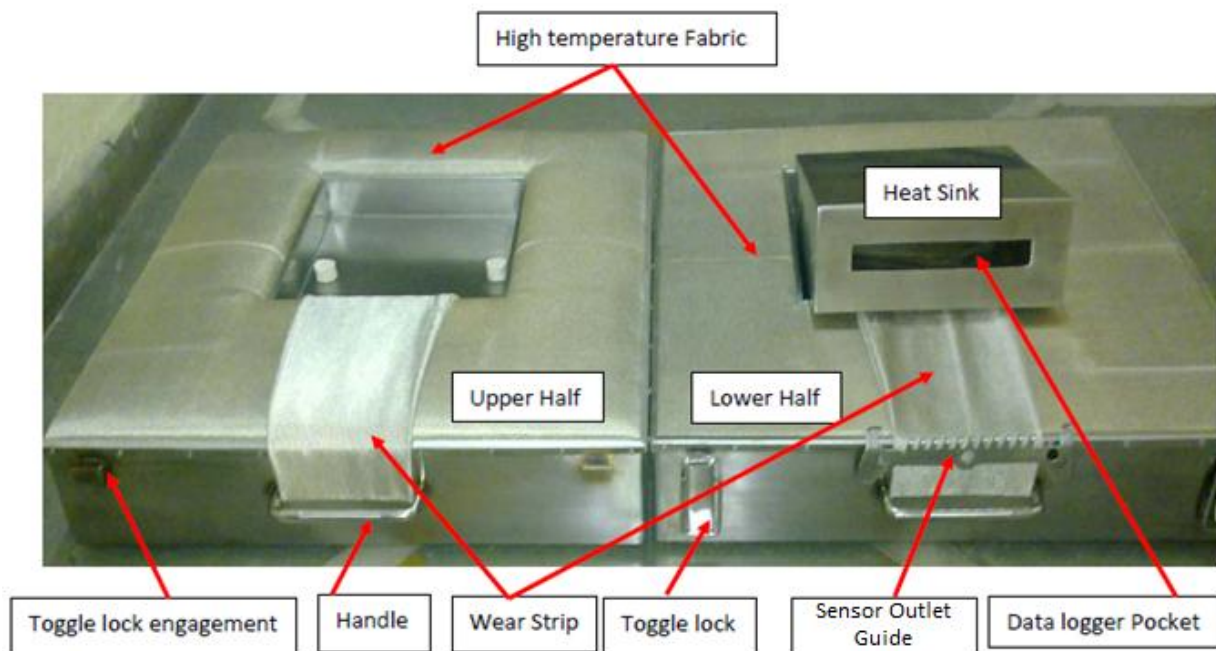
Figure: HB 1015 unit. HB 1012 unit not pictured.

Elements of the Thermal Barrier

There are several guidelines to follow that will ensure the longest life of the thermal barrier:

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1. Do not let the high temperature fabric in the lid and the base rub or abrade against any surface. Keep the cloth facing upwards when the unit is open.

2. Store the thermal barrier in the pelican case it is shipped in. If it cannot be stored in the pelican case, it should be kept in a dry location. In this case, it is recommended that the thermal barrier be kept inside a plastic bag.

3. Replace the wear strips with new ones before the high temperature fabric is damaged. The high temperature fabric should not come in contact with the sensor cables.

4. The start temperature of the thermal barrier should be less than 77° F (25° C).

5. If possible, keep the barrier unbuckled during storage.

6. When the thermal barrier has just come out of the furnace and is hot, open the lid and keep the unit on a perforated surface to let it cool down. Handle with high temperature gloves.

7. Any time the unit is unbuckled, it should be prevented from sliding to reduce wear on the matting.

8. When placing the upper half on top of the lower half, keep the wear strips clear of the sensor outlet guide.

9. When locking the thermal barrier, place all four toggle clamp arms into the engagements before pressing the toggle clamps down to lock. Similarly, when unlocking, loosen all four clamp arms before pulling apart from the engagements.

10. NEVER EXCEED THE THERMAL CAPACITY (TEMP / TIME CAPACITY). Refer to chart below. Neither unit should be used at temperature above 1832° F (1000° C) for any amount of time.

Thermal Barrier Specifications

Temperature in °F	Temperature in °C	HB 1012 Max Time at Temp	HB 1015 Max Time at Temp
482	250	7hrs 30min	13 hrs
572	300	5hrs 45min	10hrs 30min
662	350	4hrs 45min	8hrs 35 min
752	400	4 hrs	7hrs 25min
842	450	3hrs 30min	6hrs 30min
932	500	3hrs 30min	5hrs 35min
1022	550	2hrs 50min	5hrs
1112	600	2hrs 30min	4hrs 40min
1202	650	2hrs 15min	4hrs 15min
1292	700	2hrs 10min	4hrs
1382	750	2hrs	3hrs 45min
1472	800	1hr 50min	3hrs 30min
1562	850	1hr 45min	3hrs 15min
1652	900	1hr 45min	3hrs
1742	950	1hr 30 min	3hrs
1832	1000	1hr 30 min	2hrs 50min
DO NOT OPERATE AT TEMPERATURES ABOVE 1832° F (1000° C)			

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Using the Thermal Barrier with the Data Logging Electronics

1. Open the thermal barrier and set the halves next to each other.
2. Insert the data logger into a plastic/polythene bag.
3. Set the heat sink up so that the pocket faces upwards, and insert the data logger into the pocket.
4. Lean the heat sink onto the edge of the thermal barrier as shown in picture 2 and route the thermocouple wires through the sensor outlet guides.
5. Place the upper half on top of the lower half, keeping the wear strips clear of the sensor outlet guides. Fasten all four toggle locks.

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Replacing Wear Strips

To replace the wear strips, simply unscrew the locking plate and put the new wear strip in place. Screw the locking plate back on.

Locking Plate

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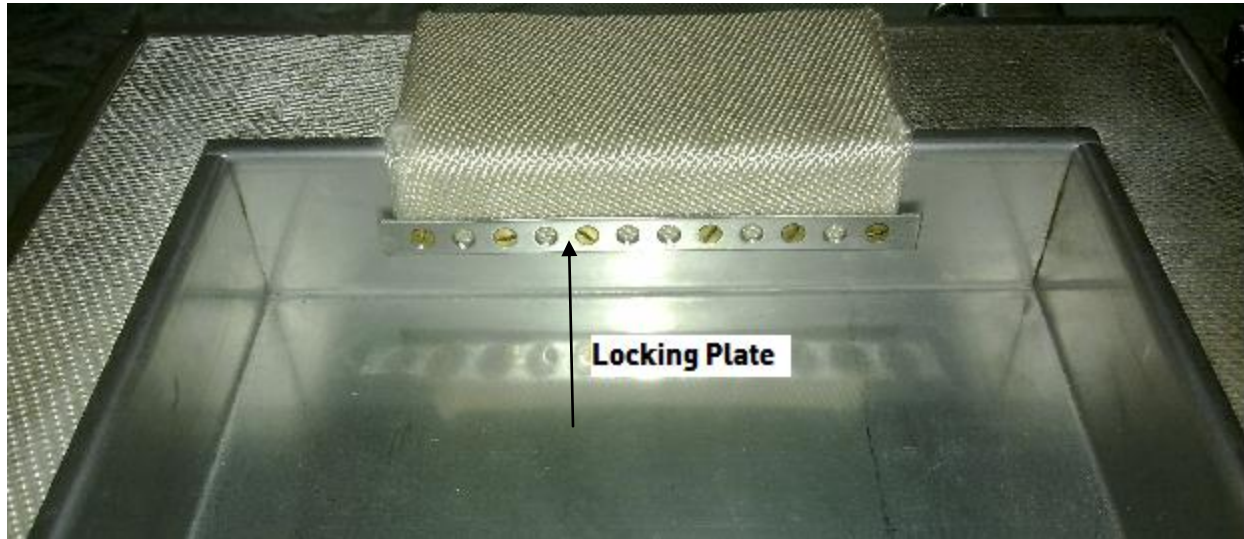
Getting Started

To begin using the HB1000, first load the SDS Reporter software provided with the unit onto a computer.

 Connect thermocouples to the data logger. Channel one must be connected in order to collect data.   The thermocouples can be connected using a mini adaptor.   When connecting the thermocouples, the positive side is down and is the smaller of the two terminals.

Next, connect the data logging electronics to the computer with a USB cable. Verify that the USB Connection Active LED is blinking red. Instructions for installing the driver for the HB1000 can be found under **Install Driver** on page11. Assign the on and off data logging temperatures for the unit. For continuous data logging, the on temperature should be set to 0°F and the off temp to the maximum temperature, which is 3276°F. Instructions for setting the on and off temperatures can be found under **Device Settings** on page12. Thermocouple one controls the on and off status of the data logging; this cannot be assigned to any other thermocouple. Once the on and off temperatures are assigned, disconnect the unit from the computer. If the on temperature is below ambient temperature, the Data Logging In Process LED should be blinking red.

At this point, the data logger setup is complete. The data logger can be placed into the heat sink with the thermocouple wires facing out. Please see the section **Using the Thermal Barrier with the Data Logging Electronics** to ensure proper arrangement of the parts.

Once the HB1000 has come out of the furnace, pull the electronics component out of the thermal barrier as quickly as possible. The thermal barrier should be handled with heat resistant gloves. After removing the electronics, turn the switch OFF and connect the unit to a computer with a USB to charge. This will discontinue data logging. Keeping the unit turned off or charging when it is not in use will greatly prolong the battery life of the electronics.

Before beginning a new survey, the electronics must always first be connected to the computer and scanned by the Uniformity Box software if the device has been turned off. Once the device has been found, it will have the same On and Off temperatures assigned from the previous survey, and it can be disconnected from the computer at that time to begin data logging.

Downloading a Survey

Connect the electronics to the computer with a USB cord. Verify that the USB Connection Active LED is blinking red. To download a survey, go to SDS → Download Surveys and Data, and select the unit from the SDS drop down menu. Hit the **Download** button. The program will download every job (survey) on the unit each time this operation is performed. To delete old jobs from the device, use the **Erase Jobs** button on the Device Settings menu. Erasing jobs is discussed further in the **Device Settings** section.

Once the jobs are downloaded, close the window. Select File → New. The Report Properties tab will open. The first box on this page is labeled Data Sources. Click the button with three dots next to the Data field. This will display the Load Survey Data window. Select the

appropriate job; the most recent job performed will be at the top of the list. Once the job is highlighted, a template can be used by clicking the **Attach Template to Survey** button in blue located just below the list of jobs. This will display the Open Template File window with the option to open a local survey template file located on the computer. Hit the **Browse** button, select the appropriate template, and press **Open**. Hit the **Open File** button at the bottom of the Open Template File window. This will display the Select Template window. Highlight the appropriate template, and hit **Ok.** Now, press the **Use** button in the Load Survey Data window. For more information on creating a template, please see the section **SDS Template Manager**.

At this point, the data from the job performed as well as the data fields that correspond to the selected template will be populated. Any other necessary information can be entered by clicking through the Report Properties tabs. For more information on this, please see the section **SDS Reporter Software**. The chart for the survey can be viewed by clicking the Chart tab.

To create a report using this job, click the button next to the Report Template field, located on the Report tab of Report Properties. Select the appropriate report file, and hit **Open.** Go to File → Print Preview → Print Preview Report to view the report. The report can be printed from here. For more information on creating a Report Template, please see the section **Creating a Personalized Template**.

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HB1000 Software

The HB1000 software provides a simple interface for accessing data collected by the uniformity box.
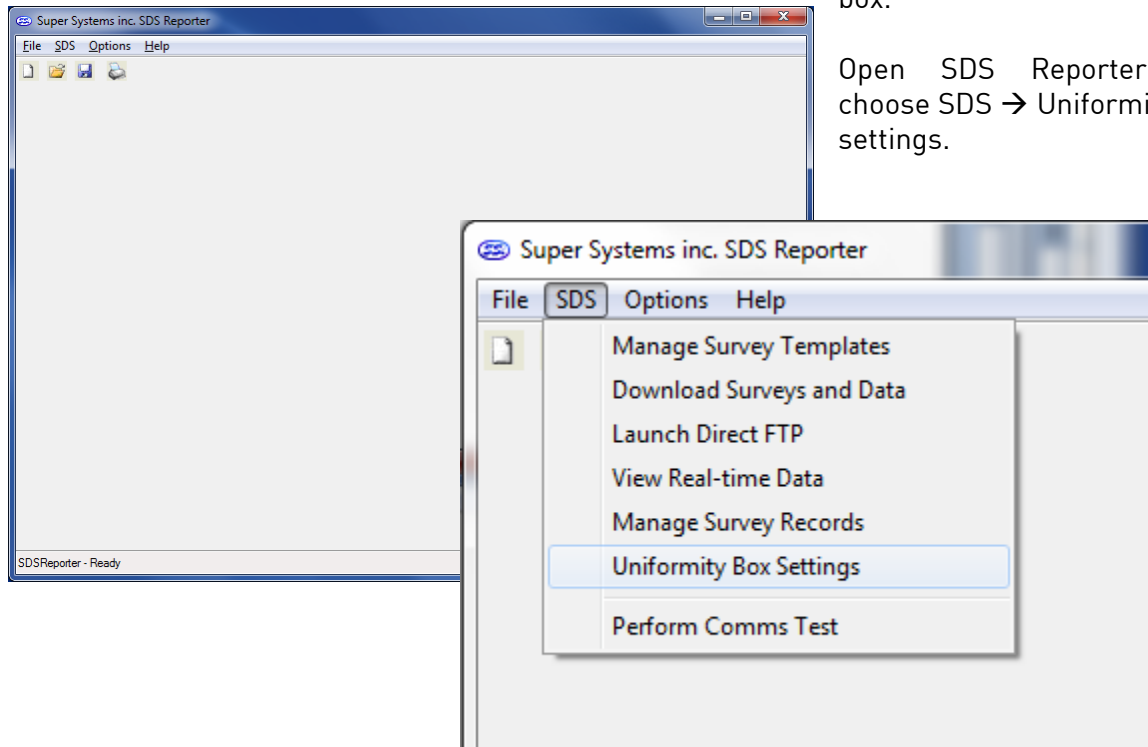
Open SDS Reporter and choose SDS → Uniformity Box settings.

HB1000 Menu

The HB1000 Menu consists of three buttons: **Calibrations, Device Settings,** and **Install Driver.**

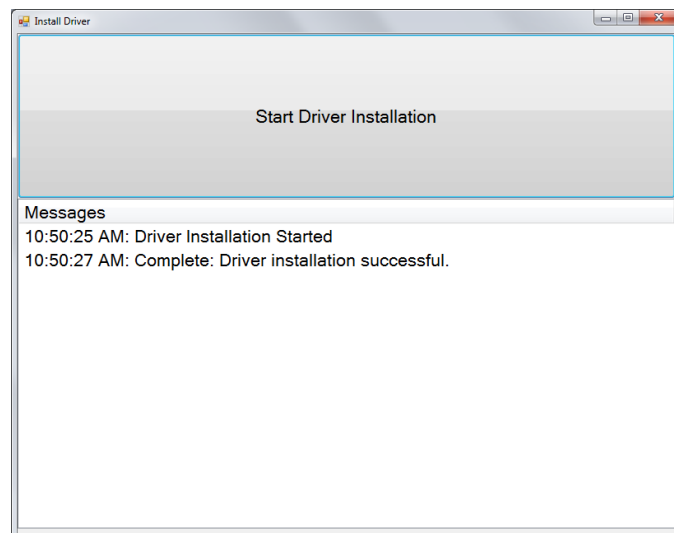At any point, clicking the red X in the top right corner will bring the operator back to this menu screen.

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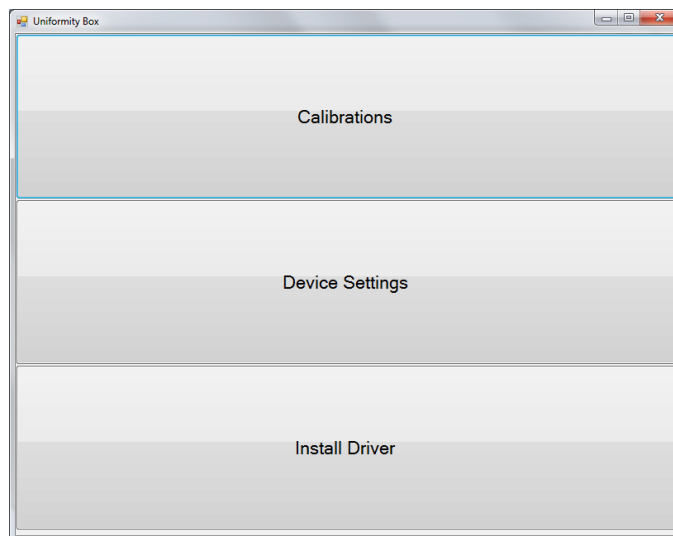
Install Driver

First, connect the unit to the computer via a USB cord. Select **Install Driver**. This will bring up the following screen:
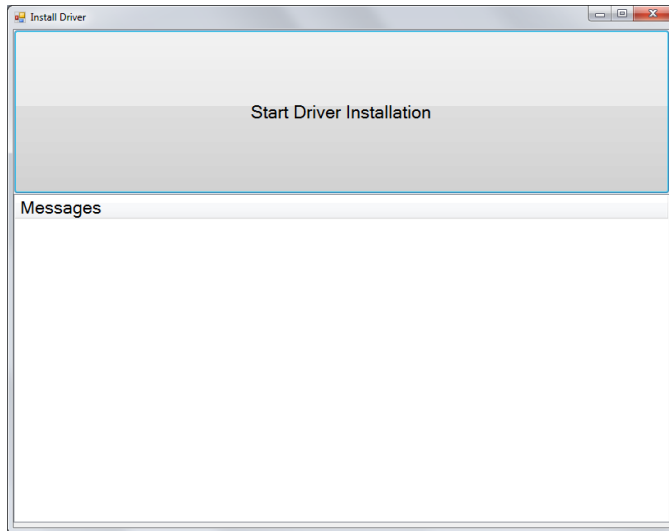
Click the **Start Driver Installation** button. This will allow the software to recognize the device.

There will be messages stating the driver installation has started and has been successful. Click the red X to return to the Menu.

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Device Settings
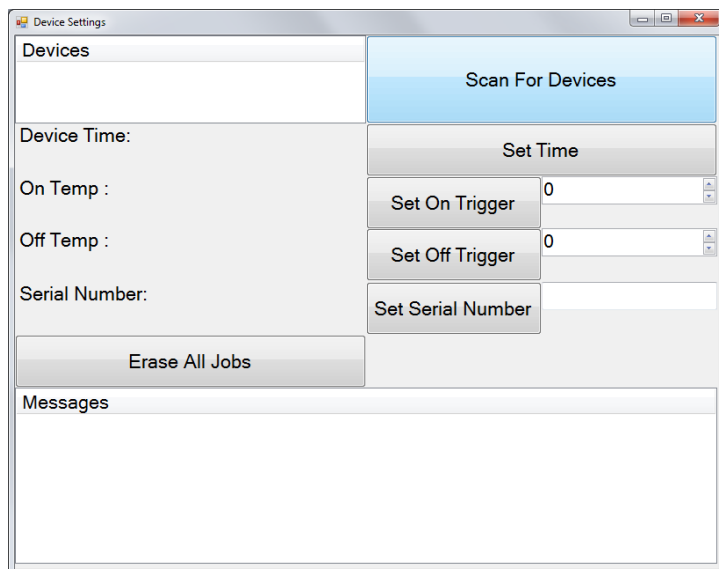
Pressing the **Scan for Devices** button will display a list of the devices on the network in the top left corner. If the device has been given a serial number, this is how it will be displayed, along with the port it is communicating to. Select the appropriate device. The settings displayed will include the Device Time, the On Temp, the Off Temp, and the Serial Number. On the right hand side of the Device Settings window, there are four buttons which allow the operator to change the settings. Channel one will always control the on and off temperature. The device must be selected before changes can be made.

The **Set Time** button will change the time on the device to match the time on the computer it is connected to.

The **Set On Trigger** button will change the On Temp for the HB1000. When thermocouple one, which controls data logging, reaches this temperature, the controller will begin data logging. The **Set Off Trigger** button will change the Off Temp for the controller. When thermocouple one reaches the off temp, a timer will count down from 10 minutes. After this timer is finished, once the temperature falls below the off temp, the data logger will stop recording data. For continuous data recording, it is recommended that the on temp be set to 0° and the off temp be sent to the maximum of 3276°.

The **Set Serial Number** button allows the operator to name the device. This can be a name using letters, numbers, or a combination of the two.

The **Erase All Jobs** button will erase all of the data from the device. This will erase all jobs from the device; it is not possible to choose only certain jobs to erase and to keep others. Erasing the jobs will take 60 seconds, and a timer will count down during this operation.
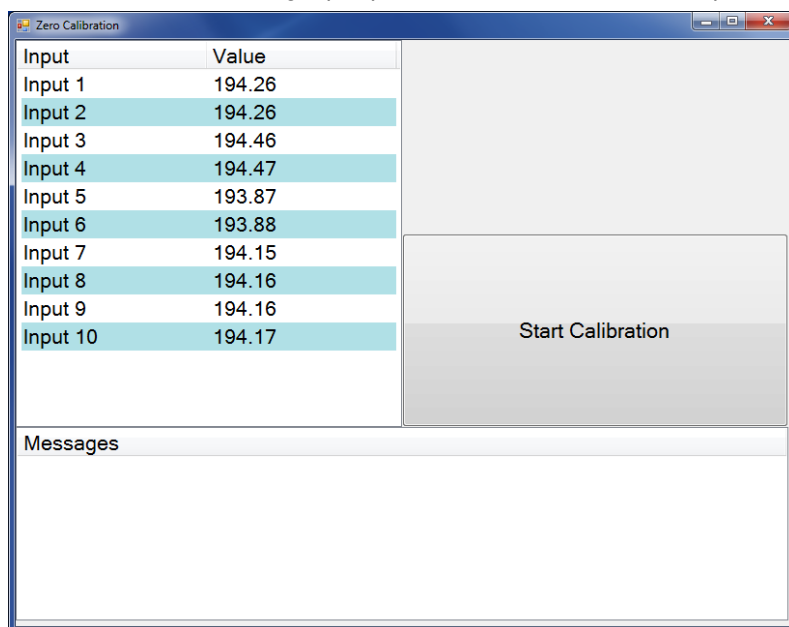
HB1000 Thermal Barrier Rev-
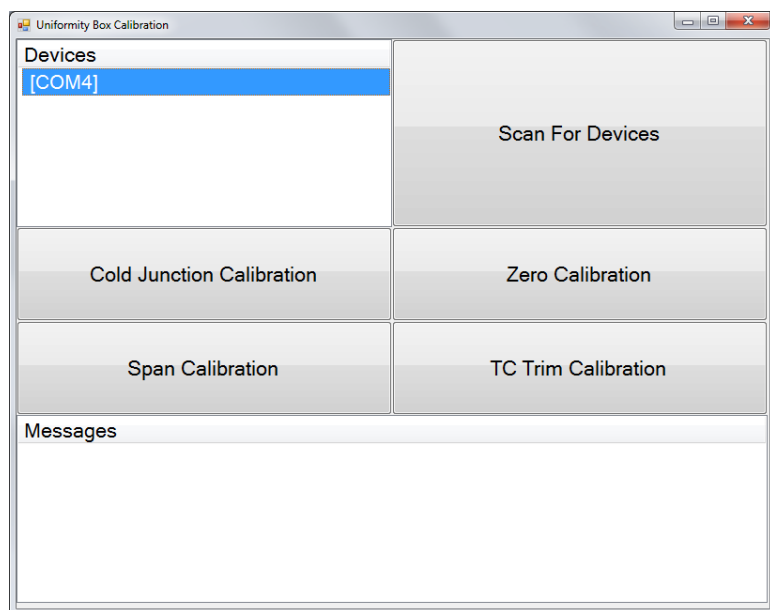
Calibrations

There are four types of calibrations for the HB1000. All of the thermocouple channels must be calibrated at the same time.

Zero Calibration

To calibrate the voltage properly, both a zero and a span calibration must be performed. For zero and span calibrations, only regular copper wire should be used – not T/C wire. Connect each positive input to its corresponding negative input or connecting a calibrator and outputting 0.0 volts DC (VDC). Once the connections are made, press the **Start Calibration** button. Theoretically, this should yield 0.0 VDC, however many times it is close but not quite 0. Now a span calibration should be performed.

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Span Calibration

Following a zero calibration, perform a span calibration. For zero and span calibrations, only regular copper wire should be used – not T/C wire. To perform a span calibration, hook up a calibrator to each input. From the calibrator, output 72 millivolts. Set the Calibration Value to 72 mV on the computer software. The voltage range should be set to 80 mV for a type K thermocouple. Press the **Start Calibration** button. More often than not, the scaled voltage will read something slightly off from 72 mV, for instance 72.09 instead of 72. The voltage is then calibrated according to the results of the zero and span calibrations.

Span Calibration		Calibration Value:	0.00
Input	**Value**		
Input 1	194.26	Voltage Range:	2560mV
Input 2	194.26		
Input 3	194.46		
Input 4	194.47		
Input 5	193.87		
Input 6	193.88		
Input 7	194.15		
Input 8	194.16	Start Calibration	
Input 9	194.16		
Input 10	194.17		

Messages

T/C Trim Calibration

For the T/C Trim calibration, T/C wire should be used. The T/C trim calibration is performed by connecting a thermocouple calibration device to each input and outputting a trim temperature that is used be equal to the expected operating temperature. For example, the calibration could be completed using an output temperature of 1700°F. After the zero, and span calibrations, the temperature may read about 1701.5°F instead. This type of calibration should be used in lieu of the regular cold junction calibration unless the cold junction temperatures are reading a temperature that is much too high for what the ambient temperature could possibly be. A cold junction calibration can be used in this instance when need be, but the T/C Trim Calibration is preferred.

TC Trim Calibration		Calibration Value:	0.0
Input	**Value**		
Input 1	330.8		
Input 2	330.8		
Input 3	330.8		
Input 4	330.8		
Input 5	330.8		
Input 6	330.8		
Input 7	330.8	Start Calibration	
Input 8	330.8		
Input 9	330.8		
Input 10	330.8		

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Cold Junction Calibration

The purpose of the Cold Junction Calibration is to calibrate the ambient temperature at each of the 10 connectors. The ambient temperature can be determined by holding a probe near the connectors and reading that value. The operator should then enter the ambient temperature into the box labeled **Calibration Value.** Press the **Start Calibration** button to run a Cold Junction calibration. Each input will then be reading the ambient temperature. A message will be displayed stating that the calibration is successful.

Input	Value
Input 1	82.33
Input 2	82.23
Input 3	82.25
Input 4	82.16
Input 5	82.12
Input 6	82.13
Input 7	82.07
Input 8	82.27
Input 9	82.3
Input 10	82.28

Calibration Value: 0.00

Start Calibration

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SDS Reporter Software

Menu

When the SDS Reporter software is started, the Menu screen is displayed.

The four menu options to choose from are: *File*, *SDS*, *Options* and *Help*. There are four buttons to choose from: New [icon], Open [icon], Save [icon], and Print [icon]. The Open menu option will allow the user to choose an existing report from a common Windows Open dialog box. The software will open the dialog box in the "SDSReports" folder (typically -C:\SSi\SDS\SDSReports) for existing reports (.SDSReport) to open.

The New option allows the user to create a new report that will include the report properties, the trend chart, and the T/C data. Of these three tabs, the selected tab will be in Red when it is active.

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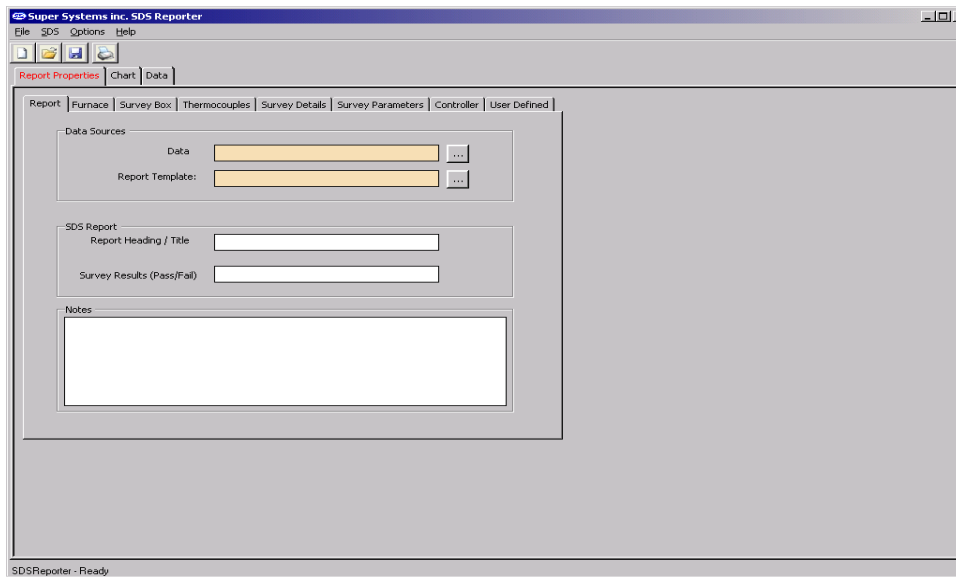
Report Properties Tab
The Report Properties tab contains several tabs, which in turn contain the information that makes up the report.

Report
The first tab is the Report tab which contains the data to use for the report, the report template to use, the report heading or title, the survey results, and any notes about the report.

Clicking on the open box, , next to the Data field will display a screen from which the user can select the interval time (ten seconds, twenty seconds, thirty seconds, one minute, two minutes, or five minutes) and also the specific survey to use.

This screen will only display survey data that has already been downloaded. To download surveys, choose SDS → Download Surveys and Data. This is explained further under the *SDS Menu Options* section.

The default interval is one minute. Select the survey to use and click the **Use** button. Information included with the data sources is: Template Name, [Company Name - Furnace Id],

(Survey box Serial number), and the date/time range of the survey data. Clicking on the open box next to the Report Template field will open a dialog box from which the user can select the specific report template to use for the report. The software will open the dialog box in the SDSReportTemplates folder (typically C:\SSi\SDS\ReportTemplates) for existing report templates to use. The Report Heading / Title field is for the heading or title of the report and the Survey Results (Pass/Fail) field is for the results of the survey. The Notes field is for any general notes for the report.

Survey Parameters

The Survey Parameters tab contains: the survey tolerance, the survey setpoint, the overtemp setpoint, the simulated load in pounds, the microns, and the option of heating or cooling.

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Survey Details

The Survey Details tab contains the company name, the survey start date, the survey duration, the actual duration of the survey, the survey specifcation(s), who performed the survey, who arrpoved the survey, the date range for the survey, and the due date of the next survey.

Thermocouples

This tab contains the information about the thermocouple settings and it also lists the active thermocouples. The information in the thermocouple settings includes: the temperature type (F or C), the number of thermocouples, the number of T/Cs used in the report, the thermocouple type, the thermocouple gauge, the thermocouple spool number, the person who performed the calibration, the date the thermocouple was calibrated, and the thermocouple spool correction factor.

Clicking on the **Change** button will allow the user to change the spool correction.
All values displayed to the users are corrected. That means if there is a

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defined offset for the T/C Spool and a channel offset, the user will be shown the net result of those offsets into the value displayed.

There are checkboxes for a possible forty thermocouples, but only the active thermocouples will have checks in the checkboxes. Clicking on the **Define Control T/C** link will allow the user to select the T/C or T/Cs that will be the control T/C(s). The operator can select any of the thermocouples to be the control T/C(s) and provide an optional description for that T/C.

Clicking on the Accept button will set the selected control T/C(s). Once a control T/C(s) has been selected, the T/C's number will be in Red on the "Active Thermocouples" section of the Thermocouples tab. *The thermocouple(s) that is identified as the control T/C will not be used for the T/C summary when identifying hottest and coldest channels.*

Clicking on the **View Offsets used in Survey** link will display a list of the offsets that were used on the survey. *All values that are displayed to the users are corrected values.* That means the Offset defined for these T/Cs have already been incorporated into the value the operator would see. If there is a value for the T/C Spool Correction Factor, that value will also be incorporated, providing a corrected view for the user.

Note: Checking or unchecking T/Cs on the Thermocouples Tab will affect the T/Cs plotted on the Chart Tab.

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Survey Box

The next tab is the Survey Box tab, which contains information about the survey box itself, such as the make and model, the serial number, the person who calibrated the survey box, and the calibration date.

Furnace

The Furnace tab contains the furnace ID, the make and model of the furnace, the furnace type, the furnace use, the furnace's operating range, the furnace dimensions, the furnace class, and an optional image of the furnace.

Clicking on the open box next the image frame will open a dialog box where the user can search for an image of the furnace to display.

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Controller

This tab contains the Controller manufacturer, the controller model, and the instrument type in the Temperature Controller Settings. This tab also contains the PID Settings: cycle time, dead band, output limit, PB (Gain), rate, and reset.
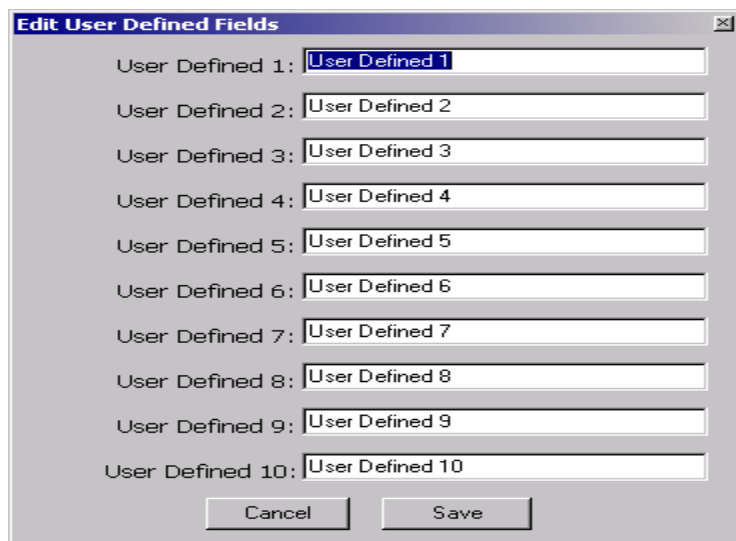
User Defined

This tab contains twenty fields that can be defined by the user and included in the report.

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To create a user defined field, click on the **Modify User Defined Fields**. This will display a screen that will allow the user to edit the fields. The user can type in the name or description of the field and click the **Save** button. These inputs can then be implemented in the report using the SDS Data Tags.

Comparison Check

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The information for the comparison check is generated from several of the Report Properties fields.

Report Field	Location in Tabs
Time	Chart Start Time
Comparison Test T/C Spool Number	Middle Left of Comparison Check
Comparison T/C Number	Top Right of Comparison Check
Comparison T/C Wire Correction Factor	Top Right of Comparison Check
Comparison Instrument Correction Factor	Thermocouples
Comparison T/C Temperature Readings	Records the temperature of the Comparison T/C
Adjacent T/C Number for Comparison Check	Top Right of Comparison Check
Adjacent T/C Wire Correction	Thermocouples, click **View Offsets Used in Survey** button*
Adjacent Instrument Correction Factor	Thermocouples, click **View Offsets Used in Survey** button
Adjacent T/C Temperature Readings for Comparison Check	Records the temperature of Adjacent T/C
CC Difference	Difference Between Comparison T/C and Adjacent T/C temperatures
Accept/Reject Criteria = Tolerance of Furnace	Set on Comparison Check Page, Middle Right
Accept/Reject	Dependent on A/R Criteria

*The offsets for the T/C Wire Correction can be adjusted solely for the purpose of the comparison by checking the box on the Comparison Check page labeled **Use Custom Wire Corrections.**

A header text and a body text can be put in the report. There are **Preview Report** and **Print Report** buttons in the top left hand corner of the Comparison Check page.

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Chart Tab

The Chart Tab contains the charted information from the time specified on the survey. When the chart tab is active, the chart toolbar buttons also appear and these buttons can be used to zoom in on a section of the chart, pan the chart up, down, left or right, and refresh the chart back to its original values. The screen will display 2 horizontal lines that represent the high and low temperature tolerance levels based on the setpoint. This display will change based on the tolerance level and setpoint defined in the Report Parameters.
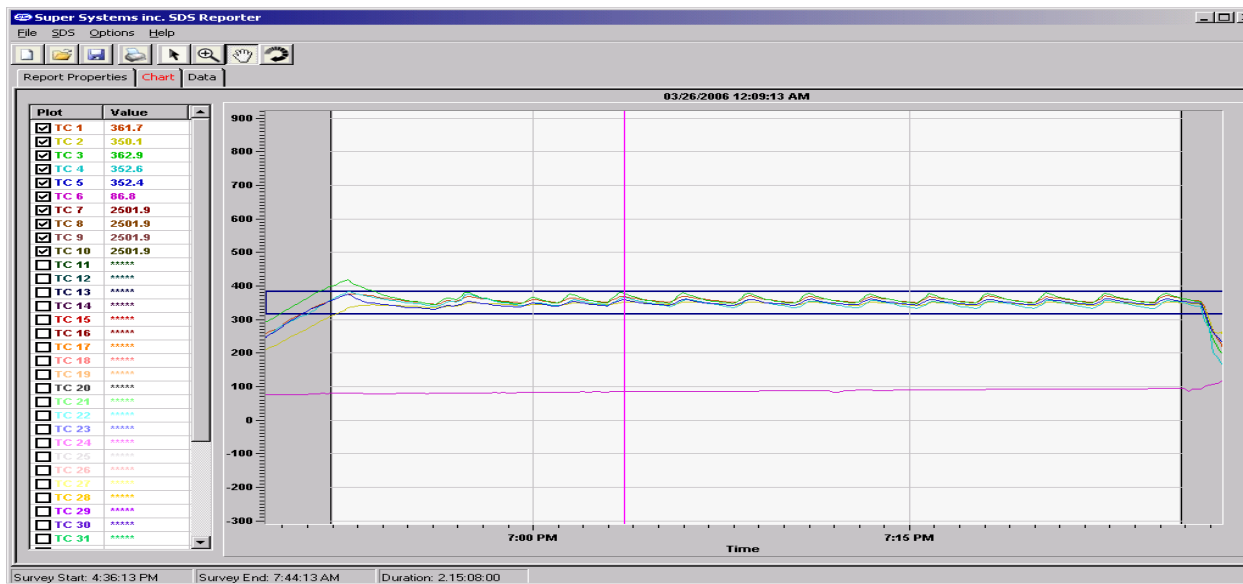
Note: checking or unchecking T/Cs on the Chart Tab will affect the Active T/Cs on the Report Properties – Thermocouples tab.

Data Tab
The Data Tab contains the data from each thermocouple for the each interval selected from the Load Survey Data screen.

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Clicking on the "Round this data off to the nearest degree" link will pop up a message box confirming the action. The rounding only affects imported data. The data in the logged files will still contain data rounded to one decimal place. Clicking the **Yes** button will round the data.
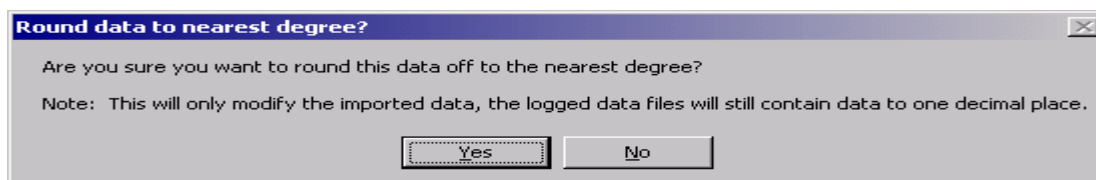
File Menu

File → Save / File → Save As / Save Button
This will save any changes made to a new or existing report. If an existing file was opened, then the software will automatically save the file without prompting. If a new file was created, then the software will display a common Windows Save dialog box that will allow the user to save the report to the "SDSReports" folder. Once the report has been saved to the "SDSReports" folder, the software will automatically save the file the next time the save command is chosen. Clicking the **Save As** menu option will automatically bring up the Save dialog box.

File → Export
There are four sub-menu options available for the export function:
    Export Report to Word
    Export Report to RTF
    Export Survey Data to CSV
    Export to Word - All
The *Export Report to Word* menu option will export the report to a Word document format, which will provide more detail than the standard .rtf file format. When this menu option is clicked, the software will automatically begin to export the report selected to a word document. Once the report has been exported, the new document will be displayed. *Note – no save dialog box will be displayed to the user*. Initially, the report is saved as "temp.doc" to the "C:\Temp" directory. The user can rename and save this report to any other desired location. *Note – any time this menu option is used, the resulting report will be saved as "temp.doc", so any previous report that has not been re-saved will be lost*. The *Export Report to RTF* menu option will export the report to a rich-text format (RTF). When this menu option is clicked, the software will display a Windows Save dialog box that will save the .rtf file to the "SDSReports" folder. The *Export Survey Data to CSV* menu option will export all of the survey data (as seen on the Data tab) to a comma-separated value format file. When this menu option is clicked, the software will display a Windows Save dialog box that will save the .csv file to the "SDSReports" folder. The *Export to Word – All* menu option will export all of the survey's information to a Word file (report data, survey data, eT/C).

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File ➔ Print
This menu option is slightly different from the print button. There are five sub-menu options available:
Print Report
Print Survey T/C Data
Print Approach T/C Data
Print All
Print Multiple Surveys
The *Print Report* menu option will allow the user to print out a copy of the .SDSReport file. The user will have to select the printer to print the report.
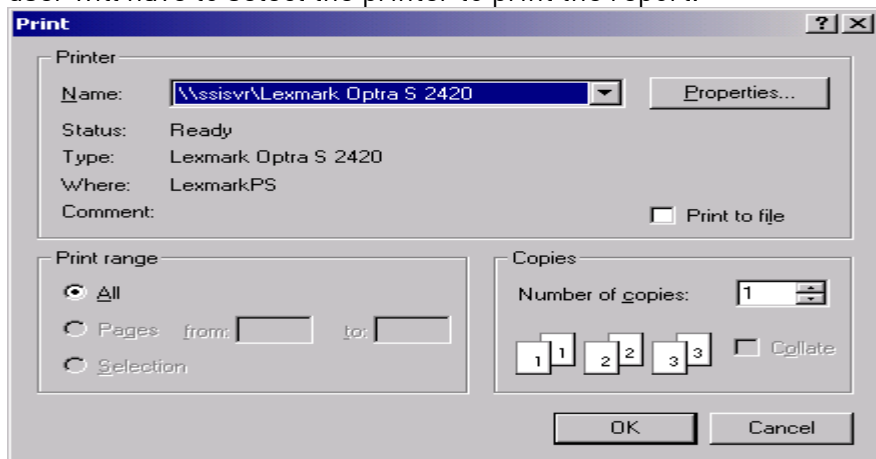
The *Print Survey T/C Data* menu option will print out a copy of the T/C data (as seen on the Data tab). The user will have the option to configure the page settings and select a printer to print to.
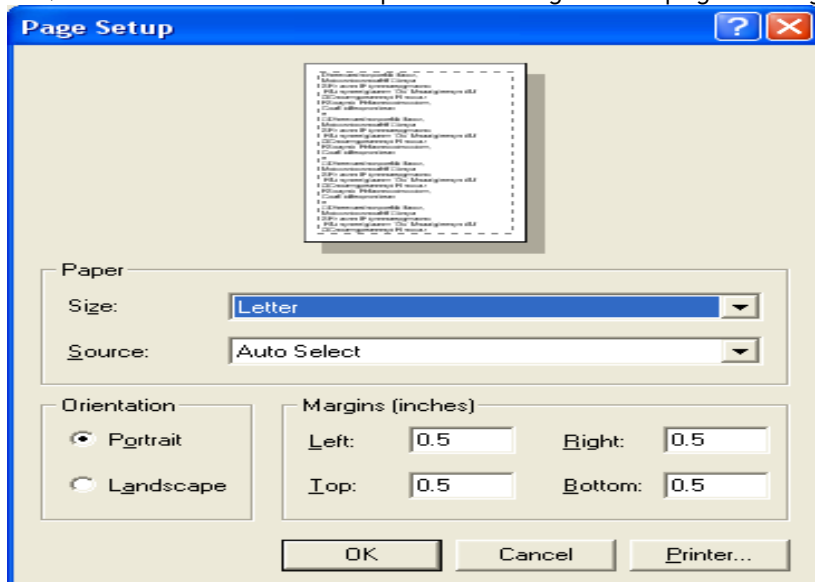
The *Print Approach T/C Data* menu option will allow the user to just print the approach data in a tabular format. The *Print All* menu option will print all of the options – Report, Survey T/C Data, Approach T/C Data – at once. The user will be able to select the printer. All three options will be printed as separate reports.

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Print Multiple Surveys

The SDS Reporter software will support the ability to print multiple setpoint survey reports. *Note – The software does not support multiple setpoint surveys*. The multiple setpoint survey report screen can be accessed by the File → Print → Print Multiple Surveys menu option. *Note – When the screen is first displayed, the main SDS Reporter screen will be closed and any unsaved data will be lost*. Any unsaved data will need to be saved before printing the multiple setpoint survey report.

The Print Multiple Setpoint Survey screen will allow the user to select a report template that utilizes the multiple setpoint survey tags (described below) and up to 5 survey files (.SDSReport).

The search buttons -

... - next to each field will allow the user to select the specific report template or survey file for the report.

Once the report template and survey files have been selected, the user will be able to export the report to Word by clicking on the **Export to Word** button.
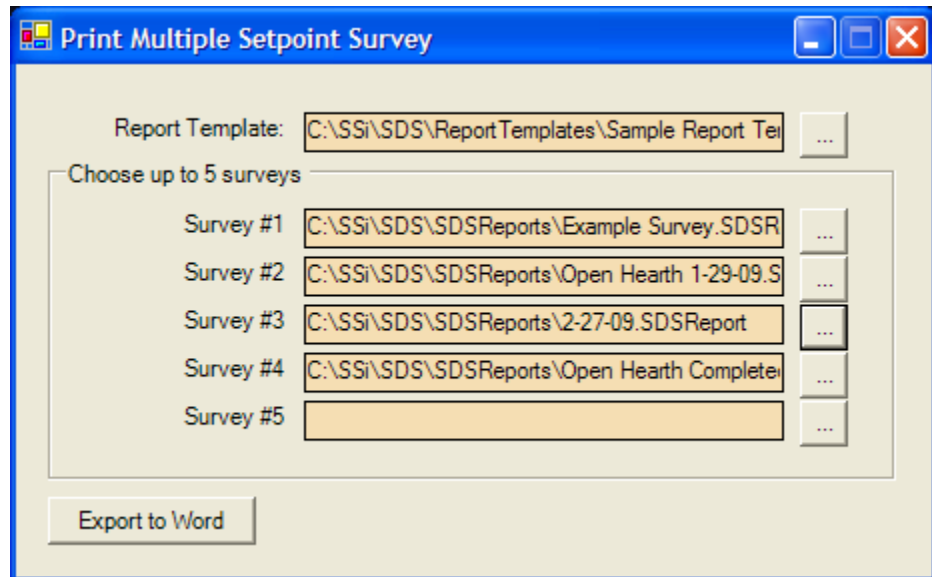
In order to view the multiple setpoints on a survey, the user will need to use the {*n*} tag, where *n* is the survey number from the *Print Multiple Setpoint Survey* screen. What the {*n*} tag does is tell the report to use the *n*th survey information for all of the following tags until another {*n*} tag is found. Using the displayed screen as an example, the following could be an excerpt from the template file:

{1} Survey #1 Duration: <SDS:DUR>
{2} Survey #2 Duration: <SDS:DUR>
{3} Survey #3 Duration: <SDS:DUR>
       Setpoint: <SDS:SP>
       Max T/C Value: #mT/Cv#
{4} Survey #4 Duration: <SDS:DUR>

This survey would display the durations for each of the survey files, and it would also display the survey setpoint and max T/C value for survey #3. Notice that the normal data tags are still used. The new tag only tells the software which survey to pull data from. *Note – For single survey reports, the report template file does not need to be updated*. If no {*n*} tag is used, the software will default to the first survey file. On the actual report the {*n*} tag is invisible.

When the *Print Multiple Setpoint Survey* screen is closed down, the main SDS Reporter screen will re-open.

Print Button

When the user clicks on the Print button, the software will display the print preview screen, which is similar in design and function to the print preview screen on the View Real-time chart.

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File → Print Preview

There are three sub-menu options available:

Print Preview Report

Print Preview Survey T/C Data

Print Preview Approach T/C Data

Each option will display a print preview of the desired report.
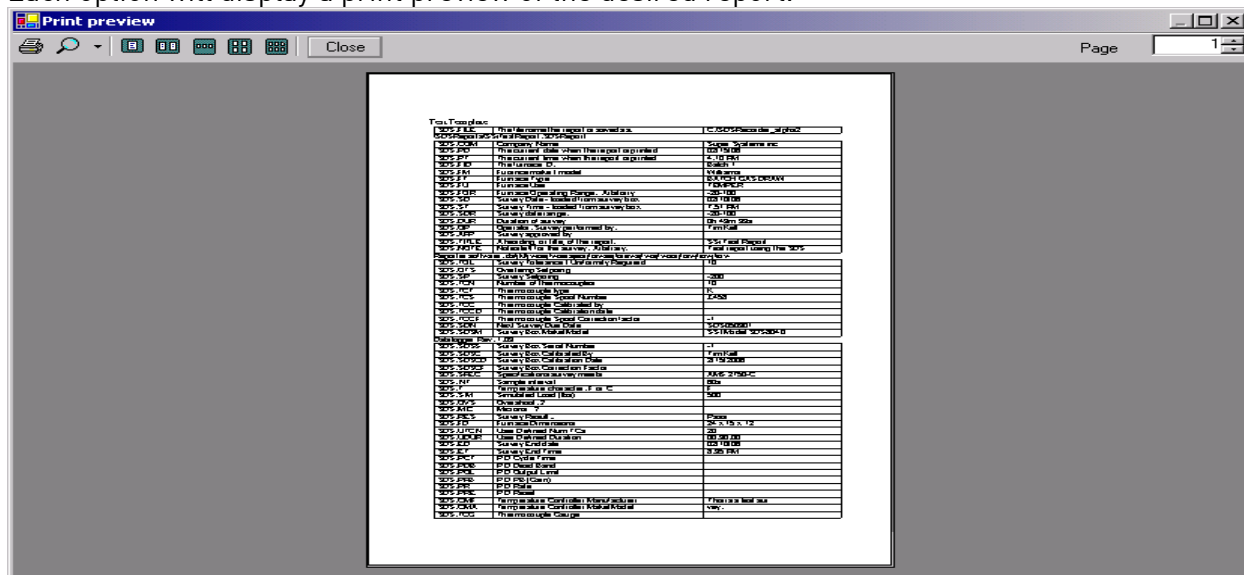
File → Exit

This menu option will exit the application.

<u>SDS Menu Options</u>

SDS → Manage Survey Templates

The Manage Survey Templates menu option will display the SDS Template Manger screen, which will allow a user to add new templates and modify existing templates. See the section **SDS Template Manager Screen** for a more detailed description of the functions of this screen.

SDS → Download Surveys and Data

The Download Surveys and Data menu option will allow the user to download surveys from a specific instrument. When the menu option is clicked, the software will begin to search for any and all dataloggers located on the network .

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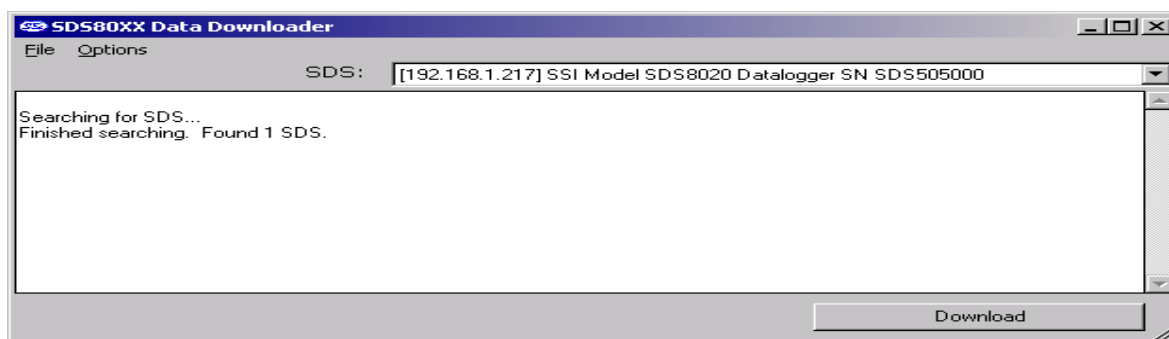
Any datalogger found on the network will be added to the drop-down list at the top of the screen. If no devices are found, a message box will pop up letting the user know that no devices were found on the network. Check the network connections to verify that any datalogger and computer is properly connected to the network.

Select the instrument from which to download the data files from the drop-down list box labeled "SDS:". *Note: Currently, the drop-down list will also populate with any Video Recorder data loggers as well. Use caution when selecting the instrument to download data from, since downloading/deleting data from a Video Recorder using the SDS Reporter software could cause undesirable consequences.* Under the *Options* menu, the *Download* menu option will allow the user to choose to download only data that has been used in surveys, or all of the logged data. The SDS data logger will log data continuously when it is on regardless if a survey is running or not. There will be a check mark next to the menu option selected. The default menu option is *Only data used in surveys*.
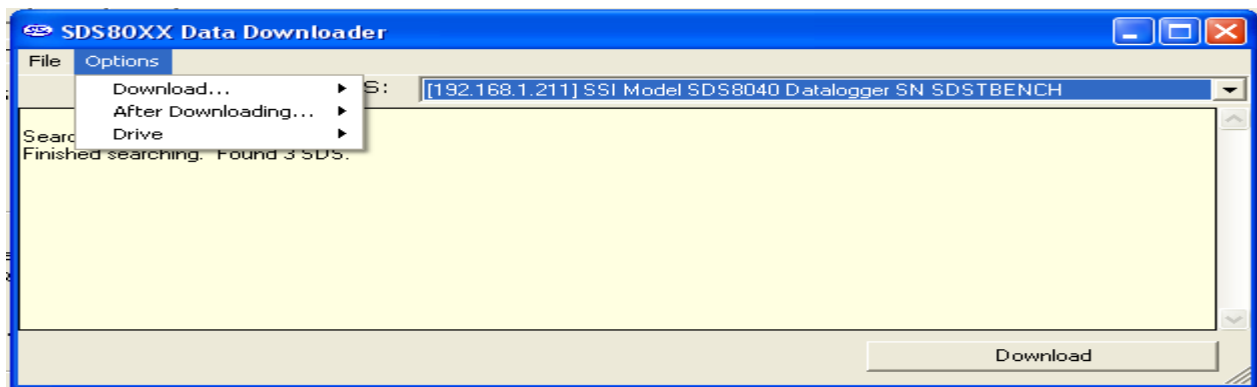
All survey data that is captured on the data logger is transferred to the PC using the SDS Reporter software and can be reviewed at any time from that PC.

The SDS software will begin to download the survey data once the user has clicked on the "Download" button. The button will read "Abort" while the data files are downloading. If a connection to the device cannot be established, the software will display a message box informing the user.

If the user chooses to only download data files used in surveys, and no data files are found, the software will display an error message.

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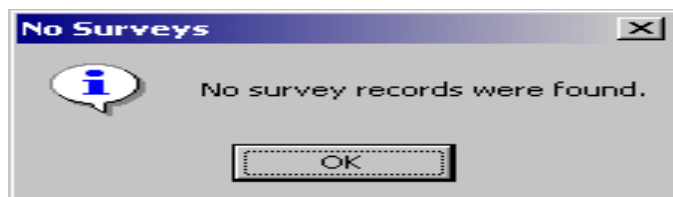
The software will display a continuous progress of the download status. Note: since there may be a large number of files to download, this process may take several minutes to complete.
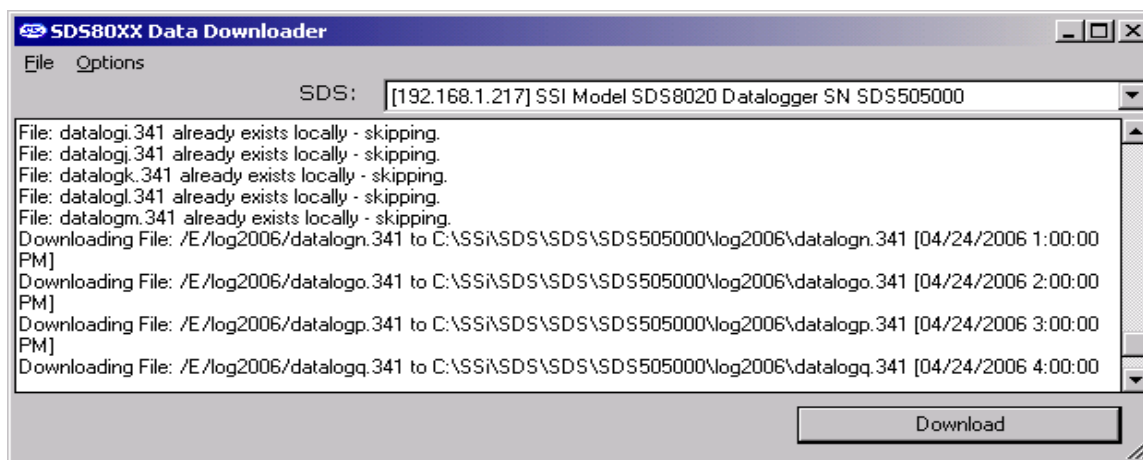
When all of the files have been downloaded, the words "Operation Complete" will be at the bottom of the list, and the button at the bottom will read "Download". A message box will also be displayed reading "Operation Complete". Clicking on the **OK** button on the message box will close down the download data screen.

Clicking on the "Abort" button will stop the download and close the SDS Data Log Extractor screen. Any files that have already been downloaded will not be erased.

<u>Options Menu Options</u>
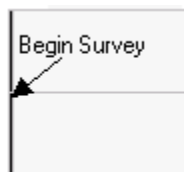
Options → Show Labels On Chart
This is a toggle switch for the application. When checked, this will display the "Begin Survey" label for the survey on the real-time graph.

<u>Help Menu Options</u>

Help → Check for Updates
The Check for Updates menu option will check for updates over the Internet and automatically update the SDS firmware and software. If an update is found, the software will display a message box asking the user for update confirmation. The software will then automatically update the files and restart the application.

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If no updates are available, then the software will display a message box informing the user.

Help → About

The About menu option displays the SDS Reporter version that is running, and all of the previous versions with any version notes.

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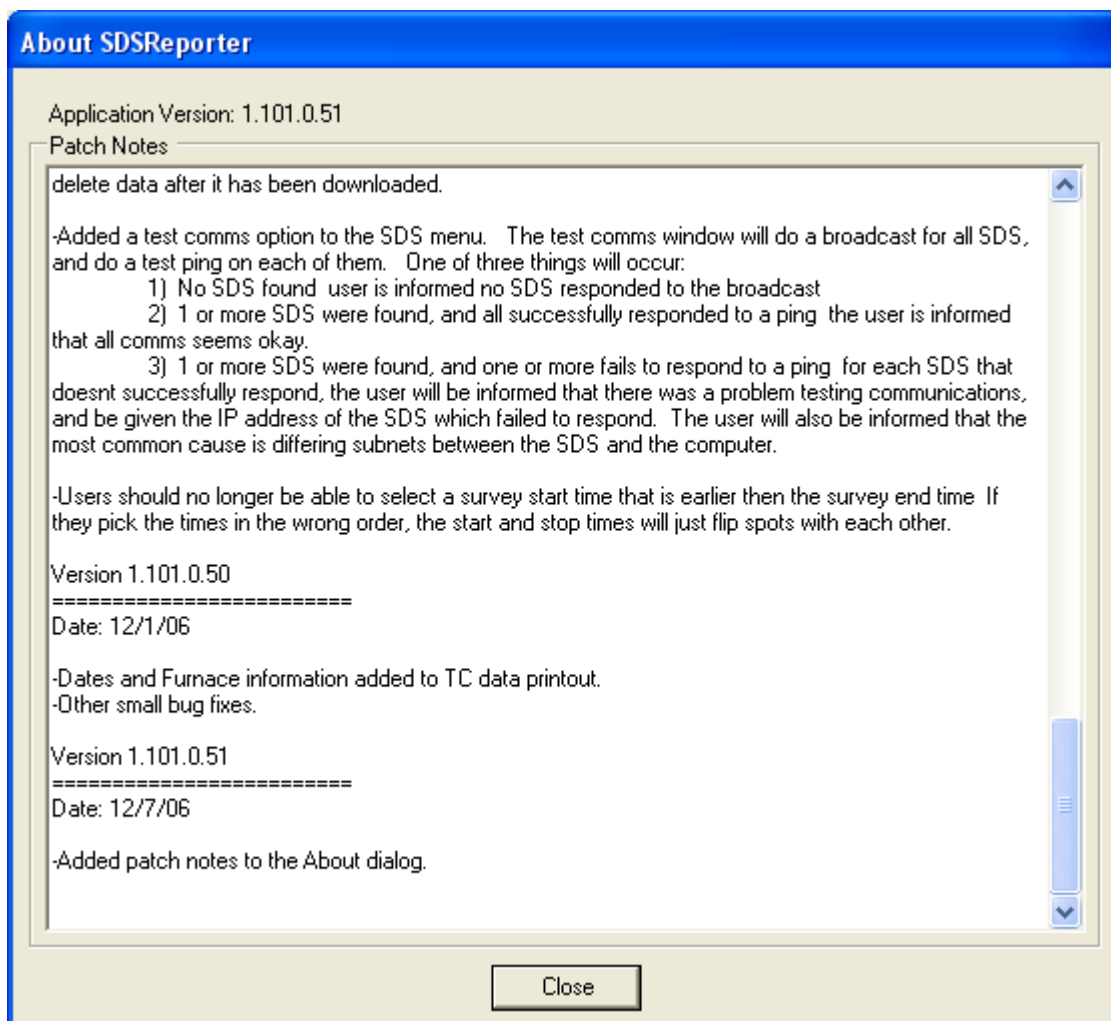
<u>SDS Data Tags</u>

SDS Data tags are created so that all of the template information and survey data can automatically be used for the report process. Data that is captured during the survey is summarized to provide the overall results for the report. This can be in the form of a graph, tabular data, text, eT/C. Data tags have been specifically created to address the uniformity requirements for AMS and other standards. Tags address, overshoot, minimum T/C with value, maximum T/C with value, trend data, tabular data, eT/C. An example of an output from the data tags can be seen by opening the Example report from the SDS Recorder provided with the installation. The only data not generated from data tags is the tabular print out of the actual temperatures. This data is generated from the *Survey T/C Data* option and will print all data points that are displayed on the graph between the "start" and "stop" selected by the user in the survey.

In the figure below (Output From Data Tags), an example of the data tags for the graph, survey setpoint, minimum and maximum T/Cs with values and deviation is shown. The data tags used to generate the information below are;

<SDS:GRAPH600x400>

T/C Survey Summary

Temperature Setpoint: <SDS:SP>°#

Minimum T/C number: **#mT/Cn#**	Maximum T/C number: **#xT/Cn#**
Minimum T/C Value: **#mT/Cv#**	Maximum T/C Value: **#xT/Cv#**
Min deviation from setpoint: **#md#**	Max deviation from setpoint: **#xd#**

TC Survey Summary

Temperature Setpoint: 350°F

Minimum TC number: **6**	Maximum TC number: **3**
Minimum TC Value: **77.8**	Maximum TC Value: **418.7**
Min deviation from setpoint: **-272.2**	Max deviation from setpoint: **68.7**

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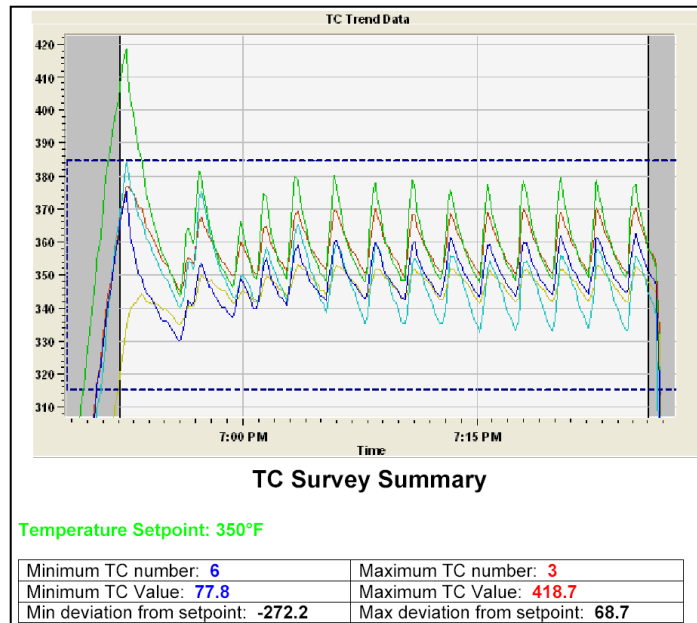
Tag	Description	Usage
SDS:FILE	The filename the report is saved as	<SDS:FILE>
SDS:PD	The current date when the report is printed	<SDS:PD>
SDS:PT	The current time when the report is printed	<SDS:PT>
SDS:FID	The furnace ID	<SDS:FID>
SDS:FM	Furnace make/model	<SDS:FM>
SDS:FT	Furnace type	<SDS:FT>
SDS:FU	Furnace use	<SDS:FU>
SDS:FD	Furnace dimensions	<SDS:FD>
SDS:FC	Furnace Class	<SDS:FC>
SDS:FOR	Furnace operating range	<SDS:FOR>
SDS:SD	Survey date	<SDS:SD>
SDS:ST	Survey time	<SDS:ST>
SDS:SDR	Survey date range	<SDS:SDR>
SDS:DUR	Duration of the survey	<SDS:DUR>
SDS:OP	Operator. Survey performed by	<SDS:OP>
SDS:APP	Survey approved by	<SDS:APP>
SDS:TITLE	The heading, or title, of the report	<SDS:TITLE>
SDS:NOTE	Notes for the survey	<SDS:NOTE>
SDS:TOL	Survey tolerance / uniformity required	<SDS:TOL>
SDS:OTS	Overtemp setpoint	<SDS:OTS>
SDS:SP	Survey setpoint	<SDS:SP>
SDS:T/CN	Number of thermocouples	<SDS:T/CN>
SDS:T/CT	Thermocouple type	<SDS:T/CT>
SDS:T/CS	Thermocouple spool number	<SDS:T/CS>
SDS:T/CC	Thermocouple calibrated by	<SDS:T/CC>
SDS:T/CCD	Thermocouple calibration date	<SDS:T/CCD>
SDS:T/CCF	Thermocouple spool correction factor	<SDS:T/CCF>
SDS:SDN	Next survey due date	<SDS:SDN>
SDS:SDSM	Survey box make/model	<SDS:SDSM>
SDS:SDSS	Survey box serial number	<SDS:SDSS>
SDS:SDSC	Survey box calibrated by	<SDS:SDSC>
SDS:SDSCD	Survey box calibration date	<SDS:SDSCD>
SDS:SDSCF	Survey box correction factor	<SDS:SDSCF>
SDS:SPEC	Specifications the survey meets	<SDS:SPEC>
SDS:INT	Sample interval	<SDS:INT>
SDS:T	Temperature character – F or C	<SDS:T>
SDS:SIM	Simulate load, in pounds	<SDS:SIM>
SDS:OVS	Overshoot (Deprecated)	<SDS:OVS>
SDS:MIC	Microns	<SDS:MIC>
SDS:RES	Survey result	<SDS:RES>
SDS:GRAPH600x400	Inserts a 600X400 image of the graph	<SDS:GRAPH600x400>
SDS:COM	Company name	<SDS:COM>
SDS:UDUR	User defined survey duration	<SDS:UDUR>
SDS:UT/CN	User defined number of thermocouples	<SDS:UT/CN>
SDS:PCT	PID cycle time	<SDS:PCT>
SDS:PDB	PID dead band	<SDS:PDB>
SDS:POL	PID output limit	<SDS:POL>

SDS:PPB	PID PB (gain)	<SDS:PPB>
SDS:PR	PID rate	<SDS:PR>
SDS:PRE	PID reset	<SDS:PRE>
SDS:CMF	Temperature controller manufacturer	<SDS:CMF>
SDS:CMA	Temperature controller make/model	<SDS:CMA>
SDS:IT	Controller instrument type	<SDS:IT>
SDS:T/CG	Thermocouple gauge	<SDS:T/CG>
SDS:OV	Overshoot - yes or no	<SDS:OV>
SDS:OD	Outputs T/C and temp if overshoot occurred	<SDS:OD>
SDS:OVT	Time the overshoot occurred	<SDS:OVT>
SDS:CTD	Inserts a note regarding the control Thermocouple. Inserts nothing if no control Thermocouple was chosen	<SDS:CTD>
SDS:CTN	Control thermocouple. Inserts "None" if None is defined	<SDS:CTN>
°#	°degree type	°#
SDS:ED	Survey end date	<SDS:ED>
SDS:ET	Survey end time	<SDS:ET>
SDS:T/CM	Thermocouple map (image)	<SDS:T/CM>
SDS:UD1	User defined field 1	<SDS:UD1>
SDS:UD2	User defined field 2	<SDS:UD2>
SDS:UD3	User defined field 3	<SDS:UD3>
SDS:UD4	User defined field 4	<SDS:UD4>
SDS:UD5	User defined field 5	<SDS:UD5>
SDS:UD6	User defined field 6	<SDS:UD6>
SDS:UD7	User defined field 7	<SDS:UD7>
SDS:UD8	User defined field 8	<SDS:UD8>
SDS:UD9	User defined field 9	<SDS:UD9>
SDS:UD10	User defined field 10	<SDS:UD10>
SDS:UD11	User defined field 11	<SDS:UD11>
SDS:UD12	User defined field 12	<SDS:UD12>
SDS:UD13	User defined field 13	<SDS:UD13>
SDS:UD14	User defined field 14	<SDS:UD14>
SDS:UD15	User defined field 15	<SDS:UD15>
SDS:UD16	User defined field 16	<SDS:UD16>
SDS:UD17	User defined field 17	<SDS:UD17>
SDS:UD18	User defined field 18	<SDS:UD18>
SDS:UD19	User defined field 19	<SDS:UD19>
SDS:UD20	User defined field 20	<SDS:UD20>

*** Survey scope data tags – {*n*} where *n* is the survey number – are used to display survey information for the multiple survey report feature. See the section *Print Multiple Surveys* for more information on how to use these data tags ***

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Sample Output

Tag	Sample Output
SDS:FILE	SDSReport1.sdsreport
SDS:PD	2/16/06
SDS:PT	11:30:00 AM
SDS:FID	BaT/Ch 1
SDS:FM	Furnace Mfg.
SDS:FT	BaT/Ch Gas Draw
SDS:FU	Temper
SDS:FD	24 x 15 x 12
SDS:FC	A
SDS:FOR	650 – 1000°C
SDS:SD	2/16/06
SDS:ST	11:30:00 AM
SDS:SDR	2/13 THRU 2/14
SDS:DUR	00:30:00
SDS:OP	Shaun Scott
SDS:APP	Scott Brown
SDS:TITLE	Test Survey 1
SDS:NOTE	This is a test survey
SDS:TOL	[+/-] 10
SDS:OTS	+10
SDS:SP	750
SDS:T/CN	20
SDS:T/CT	K
SDS:T/CS	Z458
SDS:T/CC	Soandso
SDS:T/CCD	1/15/06
SDS:T/CCF	-1
SDS:SDN	2/28/06
SDS:SDSM	SSI SDS8020
SDS:SDSS	SDS60293201
SDS:SDSC	Super Systems Inc
SDS:SDSCD	1/15/06
SDS:SDSCF	-1.0
SDS:SPEC	AMS 2750-C and D
SDS:INT	10s
SDS:T	F
SDS:SIM	500
SDS:OVS	None
SDS:MIC	N/A
SDS:RES	Passed
SDS:GRAPH600x400	[An image of the graph]
SDS:COM	Company Name
SDS:UDUR	30 mins
SDS:UT/CN	20
SDS:PCT	20
SDS:PDB	2

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SDS:POL   2
SDS:PPB   2
SDS:PR   2
SDS:PRE   2
SDS:CMF   Super Systems
SDS:CMA   7EK
SDS:IT   B
SDS:T/CG   16
SDS:OV   Yes
SDS:OD   T/C6 - 1700°
SDS:OVT   5:30
SDS:CTD   T/C5 is the control T/C, and is not used in uniformity survey
                      results
SDS:CTN   T/C5
°#   °F
SDS:ED   2/16/06
SDS:ET   11:30:00 AM
SDS:T/CM   [Thermocouple image]

T/C Offsets

Tag	Description	Usage
#o1#	Offset for T/C1	#o1#

Tag	Sample Output
#o1#	-1

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Min/Max/Mean/Spread/Deviation

| Tag	Description	Usage
#n1#	Minimum temp for T/C1 within the selected Survey region. Substitute numbers for other T/Cs	#n1#
#x1#	Max temp for T/C1	#x1#
#m1#	Mean temp for T/C1	#m1#
#s1#	Spread for T/C1	#s1#
#vn1#	Deviation @min temp from setpoint for T/C1	#vn1#
#vx1#	Deviation @max temp from setpoint for T/C1	#vx1#
#vm1#	Deviation @mean temp from setpoint for T/C1	#vm1#
#mT/Cn#	Minimum T/C number	#mT/Cn#
#mtan#	Minimum T/C number during approach segment	#mtan#
#mtav#	Minimum T/C value during approach segment	#mtav#
#mT/Cv#	Minimum T/C value	#mT/Cv#
#mT/Cx#	The maximum temperature of the minimum T/C	#mT/Cx#
#md#	Minimum calculated survey T/C absolute deviation from setpoint	#md#
#rect#	Recovery Time – the time between the time when the first T/C comes into tolerance and the time when the last T/C comes into tolerance	#rect#
#xT/Cn#	Maximum T/C number	#xT/Cn#
#xtan#	Maximum T/C number during approach segment	#xtan#
#xtav#	Maximum T/C value during approach segment	#xtav#
#xT/Cm#	Minimum temperature of the maximum T/C	#xT/Cm#
#xT/Cv#	Maximum T/C value	#xT/Cv#
#xd#	Maximum calculated survey T/C absolute deviation from setpoint	#xd#

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| Tag	Sample Output
#n1#	183
#x1#	183
#m1#	183
#s1#	12.5
#vn1#	383
#vx1#	383
#vm1#	383
#mT/Cn#	2
#mtan#	2
#mtav#	150
#mT/Cv#	1
#mT/Cx#	500
#md#	201.0
#rect#	3 mins 30 secs
#xT/Cn#	1
#xtan#	6
#xtav#	1500
#xT/Cm#	500
#xT/Cv#	183
#xd#	383.0
#ts#	13.8

Creating a Personalized Template

To create a personalized template, the user needs to open a Word document and save it to the "ReportTemplates" folder in the main installed folder as a Rich Text Format (.rtf) file. Any of the SDS data tags listed in the above section can be used to create a company-specific template. For example, suppose that someone wanted to create a simple template called "NewTemplate" which displays the current date and time the report is printed, the company name, the title of the report, the number of thermocouples used, and the results of the survey. First, the user would open a Word document and save the file as "NewTemplate.rtf" in the "ReportTemplates" folder in the main installed folder. Next, the user would set up any initial formatting settings, such as margin sizes, page layout (portrait or landscape), eT/C. Now, the user can set up the template to his or her company's specifications. Suppose that the current date and time will be in the top right corner of the report and should be 10-point Arial font. On the first line, the user can select the right-justified option, the 10-point font size option, and the Arial font option. This will leave the cursor in the top right corner. Next, the user will enter the following exactly (including the brackets): <SDS:PD>. This will be where the current date is displayed. On the next line, the user can enter <SDS:PT>. This will be where the current time is displayed. Now suppose the title of the report should be centered, bold, 14-point Arial font. The user will select the center-justified option, and the 14-point font size option. This will place the cursor in the middle of the line. The user will then enter <SDS:TITLE>. The rest of the report - company name, number of thermocouples used, and the results of the survey - can be left-justified, non-bold, 12-point font. On the next line, the user will select the left-justified option, the 12-point font size option, and deselect the bold option. The user can then enter: Company name:

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<SDS:COM>. On the next line the user can enter: Number of thermocouples used: <SDS:T/CN>.
On the next line, the user will enter: Survey results: <SDS:RES>. Next, make sure the document
is saved and close the document out. Note: it is always good practice to save a document in
progress often in case of power failure. The resulting template should resemble the figure
below.
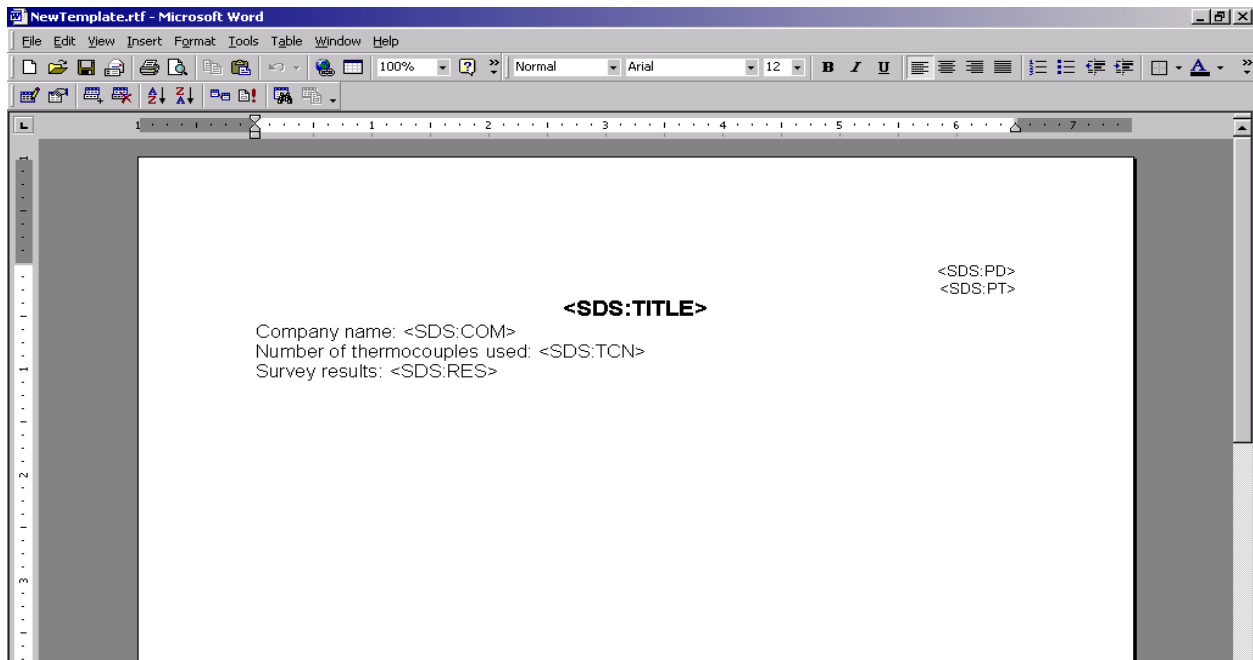
Next, the user will select the report template to use from the SDSReporter application's Open

option. Clicking on the Open button, [...] , next to the Report Template field will allow the user
to choose which report template to use. The user can choose the NewTemplate.rtf file. Next,
the user will choose the "Export to RTF" print menu option on the File menu and choose the
location to save the .rtf file. The actual report should resemble the figure below.

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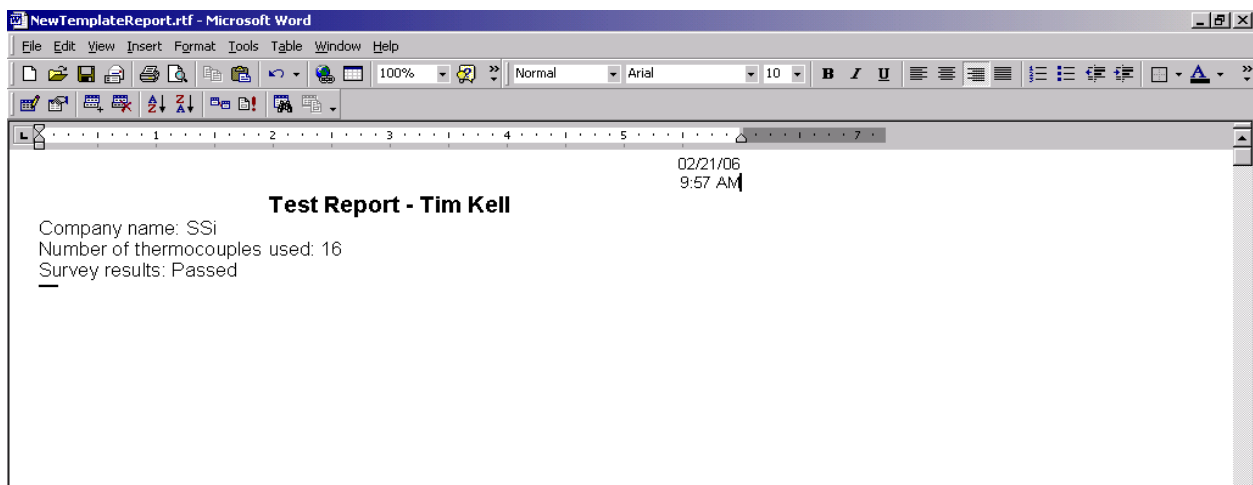
SDS Template Manager

The purpose of a template is to save the users time by filling in some of the more generic survey data. For example, the user could create a template for one customer, including company name, T/C type, eT/C; then when the survey is run using this template, this information is already present and it won't need to be entered for each survey run for that customer. The new SDS Template Manager allows the user to see any templates saved to a local computer. The Template Manager also allows the user to create new templates and save them to a local file on a computer or network.
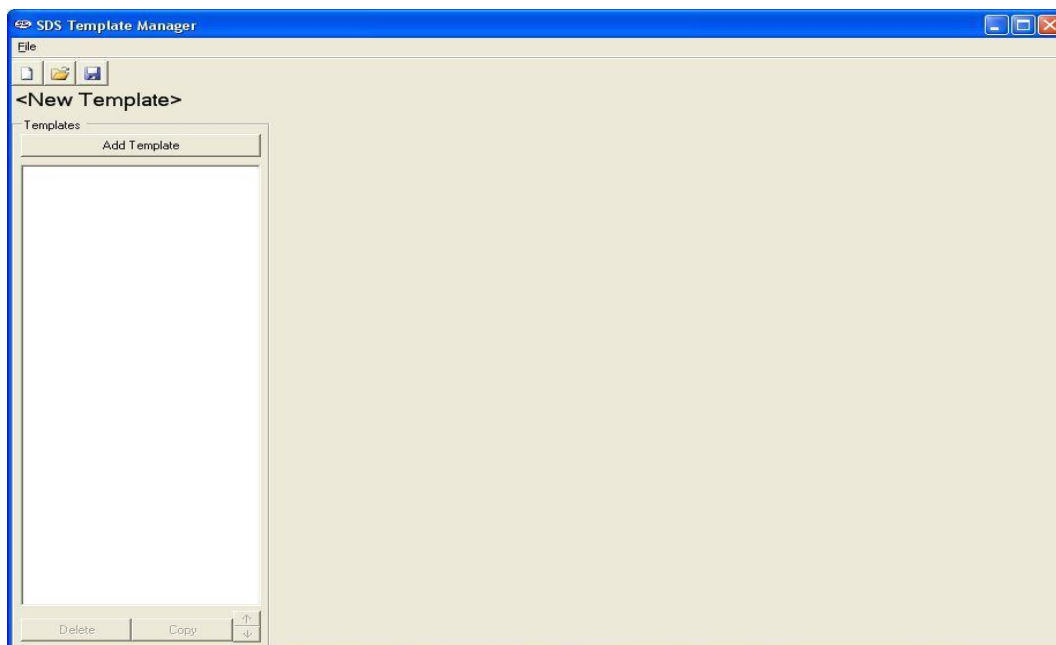
Description/Function of Template Manager Screen buttons/menu options

This section will describe the function of the toolbar buttons and menu options for the Template Manager Screen. Clicking on either the form button or the menu option will produce the same result, so each pair of button/menu option will be explained in this section.

New Button / File ➔ New

The New button, 🗋 , or New menu option will allow the user to create a new set of templates. The maximum number of templates that can be added per file is 32. Note: initially, there are no templates in the file.

Open Button / File ➔ Open

The Open button, 📂 , or the Open menu option will allow the user to open an existing template file from the local computer.

HB1000 Thermal Barrier Rev-
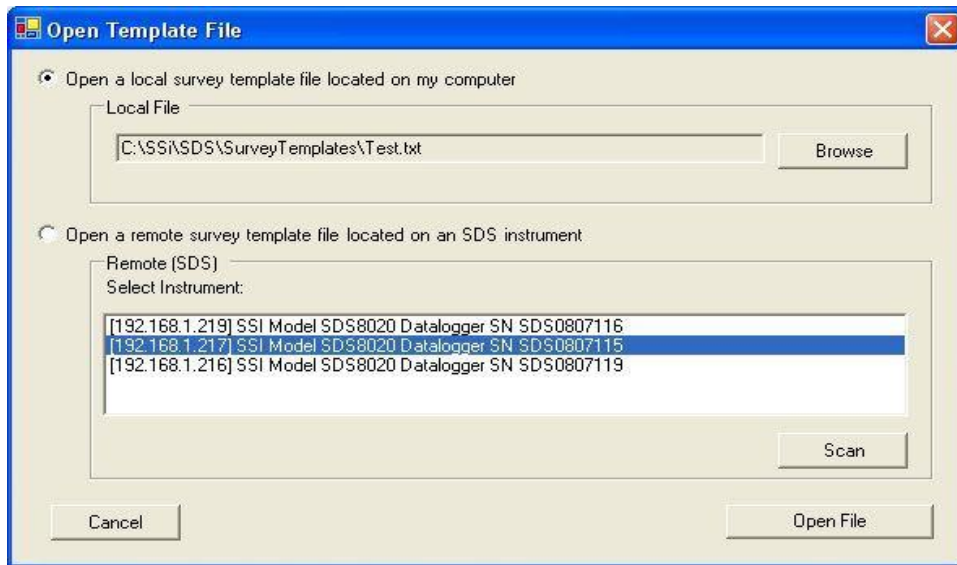
Click on the **Browse** button to select the file to open. The SDS software will display a common Windows dialog box for the user to select which file to open. Once a local or remote file has been selected, click on the **Open File** button to open the file, or click on the **Cancel** button to close down the screen without opening a file. Note: When the Open Button or the Open menu option is clicked, the tabs that contain all of the fields for the template will not become visible – an individual template must be selected to view the tabs. Once the file has been loaded, the filename will be listed above the Templates list on the left of the form.

Save Buttons / File ➔ Save

The Save button, 💾, or Save menu option will allow the user to save the current file back to the local machine. Note: Any changes made to any template will be saved at once when this option is selected. Note: If the user is working with a new template file, the Save function will act like the Save As function (see below section).

File ➔ Save As

This option acts the same way as the Save option, only it will display a dialog box that will allow the user to select the file to save. This functionality of this screen is similar to the Open Template screen. The template file can be saved locally on a computer. Click on the **Browse** button, which will display a common Windows save dialog box. The user will be able to select the location and give the template file a name. Click on the **Save File** button to save the file, or click on the **Cancel** button to close down the screen without saving the file.

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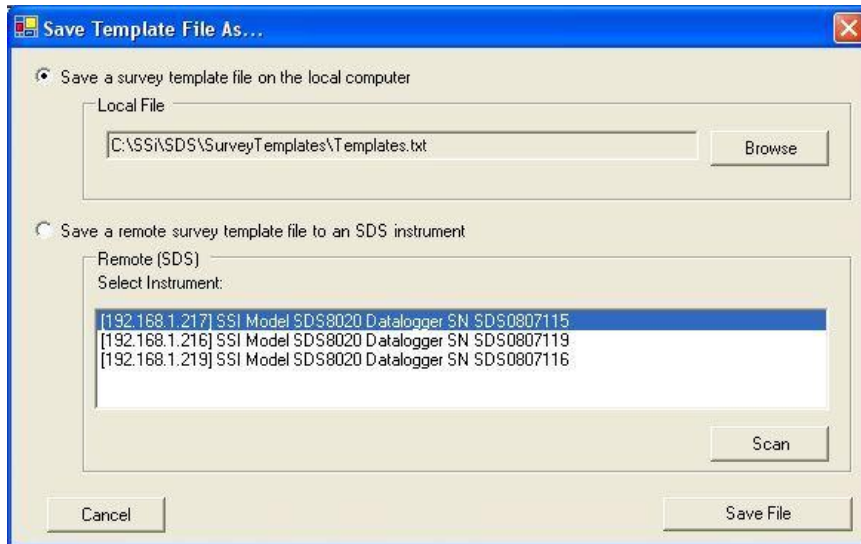
The software will always display a message box with the success or failure of the save.

Exit Button / File ➔ Exit

This option will close the Template Manager screen.

Add Template Button

This option will add a template to the collection of templates stored in memory, up to 32 total templates. The only required field is the Template Name. The default template name is <Template Name>
Once a template has been added, the new template will be loaded into the fields.

Delete Button

This option will delete a template from the collection of 32 templates stored in memory.

Copy Button

This button will copy a template into the collection, assuming there are less than 32 templates already. This would be useful if the user only wanted to change one or two items on the template, such as the setpoint.

Arrow Buttons

The arrow buttons next to the **Copy** button will allow the user to change the order of the templates in the file. This way, the more commonly used templates can be kept at the top of the file so the user will not have to scroll down to see the template on the SDS. The up arrow button will move the template up one position, and the down arrow button will move the template down one position.

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Description of Template Manager Screen Tabs

Template Information Tab

This tab contains general information about the template such as the Template Name, the Company Name, furnace information such as the furnace ID, the make and model of the furnace, the furnace dimensions, the temperature type (Fahrenheit or Celsius), the temperature range, the furnace type, the furnace use, the furnace class, and any Notes about the template. See "Description of Template Manager Screen Fields" for the maximum number of characters allowed per field.

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Survey Information Tab

This tab contains information about the survey such as the survey duration in minutes, the survey setpoint, the survey tolerance, the operator performing the survey, the simulated load, in pounds, and the specification the survey meets.

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Active T/Cs Tab

This tab contains information about the active T/Cs such as the number of T/Cs used, the Gauge of the T/C, the T/C type, spool serial number, spool correction, and a check box for each of the T/Cs. There is also a check box to allow the user to use the active settings for the T/Cs or to individually select the T/Cs to. Checking "Use these active T/C settings" will set the checked T/Cs.

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Controller Information Tab

This tab contains information about the controllers such as the Controller Manufacturer, the Controller Model, and the instrument type. It also contains information about the PID settings such as the Cycle Time, the Dead Band, the Output Limit, the PB (gain), the Rate, and the Reset.

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Description of Template Manager Screen Fields

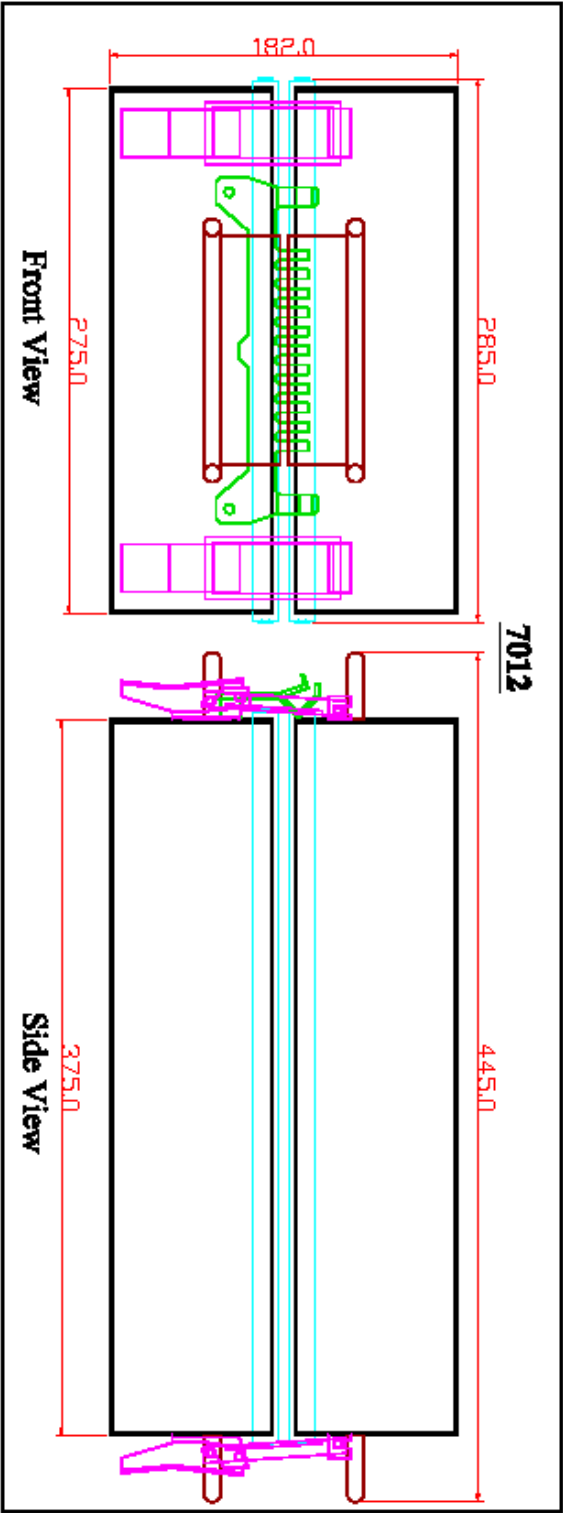This section will describe the Template Manager screen fields and list any constraint for the fields.

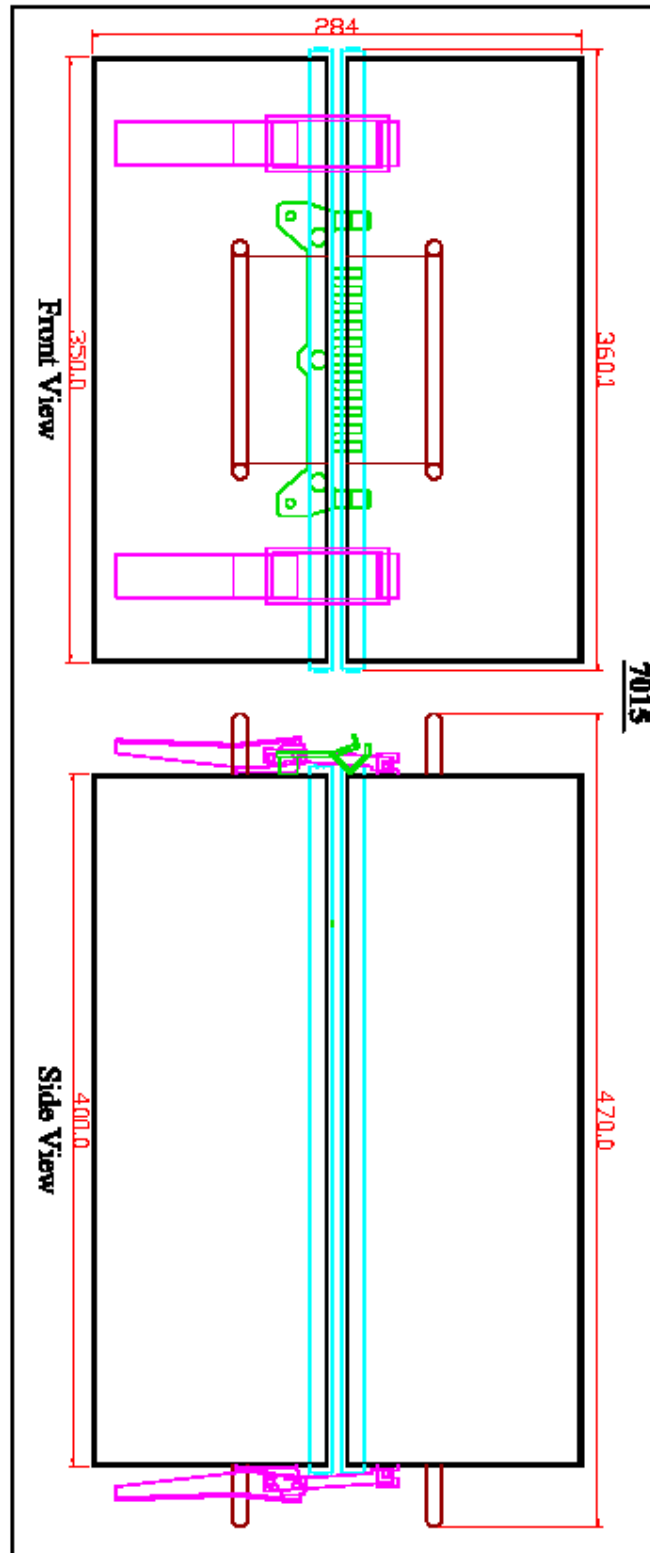| Field Name		Description
Template Name	The name of the template	
Company Name	The company's name	
Furnace ID		The Id of the furnace
Furnace Make/Model	The make/model of the furnace	22
Furnace Dimensions	The height, length, and width of the furnace	15
Temp Type		The type of temperature (Fahrenheit or Celsius)
Temperature Range	The low and high range of the furnace	10
Furnace Type		The type of furnace being surveyed
Furnace Use		What the furnace is used for
Furnace Class		The class of the furnace (Version 1.101.0.80 & above)
Notes		Any additional notes desired
Survey Duration	The duration of the survey in minutes	3
Survey Tolerance	The survey tolerance/uniformity required	2
Simulated Load	The simulated load in lbs	
Setpoint		The survey setpoint
Operator		The operator performing the survey
Specification		The specification the survey meets
Number of T/Cs	The total # of T/Cs	
T/C Type		The type of T/C
T/C Spool SN		The spool number
T/C Spool Correction	The spool correction factor	
T/C Gauge		The gauge of the T/Cs
Use Active T/C		Use the active T/C settings option
Settings		
Check box 1 – Check box 40		The active T/Cs for the survey
Controller MFG	The controller manufacturer	
Controller Model	The controller make/model	
Instrument Type	The type of the instrument	
Cycle Time		The PID cycle time
Dead Band		The PID dead band
Output Limit		The PID output limit
PB (Gain)		The PID PB (gain)
Rate		The PID rate
Reset		The PID reset

General Notes

- Checking "Use these active T/C settings" will enable the checkboxes

- Unchecking "Use these active T/C settings" will disable all 40 check boxes. The T/C check boxes will still be checked, but the SDS instrument will not use these settings.

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Line Diagrams

Line Diagram for HB 1012

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Line Diagram for HB 1015

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Rev.	Description	Date	MCO #
-	Initial Release	7-6-2012	2103

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